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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : F25D 31/00, 17/02 | A1

(11) International Publication Number: WO 97/35155

(43) International Publication Date: 25 September 1997 (25.09.97)

(21) International Application Number: PCT/IE97/00018

(22) International Filing Date: 18 March 1997 (18.03.97)

(30) Priority Data:
S960220 15 March 1996 (15.03.96) IE

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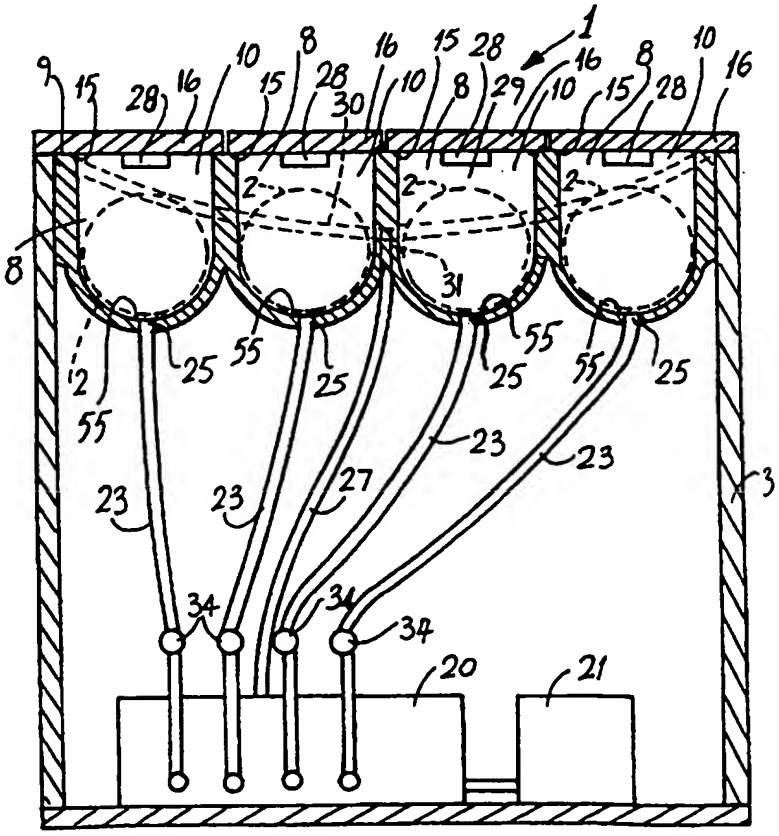
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: A COOLING DEVICE

(57) Abstract

A cooling device (1) comprises four chilling troughs (8) for receiving respective wine bottles (2) for independently cooling the wine bottles (2). A refrigeration circuit (21) maintains an aqueous solution of propylene glycol at approximately 20 °C in a reservoir (20). Four circulating pumps (35) independently circulate the aqueous solution from the reservoir (20) through the respective chilling troughs (8). An outlet weir (28) from each chilling trough (8) maintains the level of the aqueous solution in the chilling trough (8) for submerging the wine bottle (2). Four lids (16) close the respective chilling troughs (8). First and second sensors (38, 40) determine when a wine bottle has been placed in one of the chilling troughs (8) and the corresponding lid (16) has been closed. A control circuit (35) in response to the first and second sensors (38, 40) activates the relevant circulating pump (34) for circulating the aqueous solution through the chilling trough (8) for approximately four minutes for chilling the wine bottle (2). The circulating pump (34) is then deactivated and aqueous solution from the chilling trough (8) is drained through the circulating pump (34) to the reservoir (20).



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"A cooling device"

The present invention relates to a cooling device, and in particular, though not limited to a cooling device for cooling a beverage in a container, such as, a bottle or can, for example, wine in a wine bottle.

Refrigerated cabinets are provided for cooling wines and for maintaining the wines at a desired chill temperature, typically, white wine and rosé wines to approximately 5°C. In general, the interior of such cabinets is illuminated and the cabinets are provided with glass doors for permitting visual inspection of the wines therein. Such cabinets, in general, tend to be relatively large and are free-standing, in other words, are suitable for standing on a floor or the like. They are also relatively high, typically of height of approximately six feet. While such refrigerated cabinets do chill wines to the desired chill temperature, and maintain the wines at the desired chill temperature, nonetheless, they suffer from a number of disadvantages.

Because of their size, they tend to occupy a considerable amount of floor space, and this can be a significant disadvantage, particularly, in a restaurant where floor space, in general, is at a premium.

While such cabinets are relatively large, and have a reasonable storage capacity, nonetheless, in general, where a restaurant carries a relatively wide range of white and rosé wines, it is not possible to store the entire range of wines in such cabinets for maintaining the wines at the desired chill temperature.

The temperature within such refrigerated cabinets, in general, is maintained just below the desired chill temperature at which the wine is to be maintained. Accordingly, the temperature difference between wine, even at room temperature and the temperature within

the cabinet is relatively small, typically, not more than 13°C and thus, the time required to chill a bottle of wine in such refrigerated cabinets tends to be relatively long, typically, in the order of three hours. Because of this, and because of the fact that such refrigerated cabinets have a limited capacity, restaurateurs tend to stock such cabinets with white and rosé wines which are most commonly in demand. Accordingly, should a request be made for a white or rosé wine which is not stocked in the cabinet, a problem arises in that to chill the requested wine to the desired chill temperature a three hour period approximately is required. This is undesirable.

Additionally, such refrigerated cabinets tend to be relatively unattractive, and are unsightly when located in the dining area of a restaurant. Since, in general, in restaurants, particularly relatively small restaurants, space is at a premium, the only available space in many instances for such cabinets is in the dining area.

A further disadvantage of such refrigerated cabinets is that they tend to hold wine bottles up to six deep from the front to the back, in other words, six deep from the door of the wine cabinet. This, tends to lead to another problem in that those bottles adjacent the door tend to be replaced relatively frequently, while the bottles away from the door tend not to be replaced as frequently. This, is a particular problem in cases where six bottles of the same wine are placed in the cabinet in a row from front to back. In such cases, the first two or three bottles adjacent the door tend to be replaced frequently, while the bottles towards the rear may not be replaced for many months. In many instances, where a bottle is not replaced for a number of months, mould and other bacterial growth may commence to grow on the bottle, and in particular, on the label of the bottle. This, can be unsightly, and even where the mould or bacterial growth has been removed, staining may remain on the label.

A further problem with such refrigerated cabinets is that in order for the cabinet to maintain the bottles at the desired chill temperature the refrigerated cabinet must be operated continuously, thereby, requiring a relatively high and costly energy input, which typically is required on a twenty-four hour basis.

There is therefore a need for a cooling device for cooling a beverage which overcomes the problems of cooling cabinets and other known cooling devices.

The present invention is directed towards providing such a cooling device.

According to the invention there is provided a cooling device for cooling a beverage in a container, the cooling device comprising a chilling trough for receiving the container, wherein a refrigerating means for chilling a liquid heat transfer medium is provided, and a circulating means circulates the heat transfer medium between the refrigerating means and the chilling trough and through the chilling trough for cooling the container therein.

In one embodiment of the invention a flow means is provided for accommodating the heat transfer medium from the refrigerating means to the chilling trough. Preferably, the circulating means cooperates with the flow means for delivering heat transfer medium to the chilling trough. Advantageously, the flow means comprises a flow pipe communicating the chilling trough and the refrigerating means.

Ideally, the circulating means is located between the refrigerating means and the chilling trough.

In one embodiment of the invention the circulating means comprises a circulating pump.

In another embodiment of the invention a level control means is provided for controlling the level of the heat transfer medium in the chilling trough.

Preferably, the level control means is provided for controlling the level of the heat transfer medium in the chilling trough so that the container is submerged in the heat transfer medium during cooling thereof. Advantageously, the level control means comprises an outlet weir over which heat transfer medium flows from the chilling trough.

In another embodiment of the invention a return means is provided for returning heat transfer medium from the chilling trough to the refrigerating means.

Preferably, the return means comprises a return pipe located for receiving heat transfer medium from the level control means, and terminating adjacent the refrigerating means for returning the heat transfer medium to the refrigerating means.

In one embodiment of the invention an inlet port is provided to the chilling trough through which the heat transfer medium is delivered to the chilling trough by the circulating means.

In another embodiment of the invention a drain means is provided for draining the heat transfer medium from the chilling trough, for returning heat transfer medium to the reservoir from the chilling trough after the container has been cooled.

Preferably, the drain means comprises the inlet port, the inlet port being located adjacent the lowest point of the chilling trough for draining the heat transfer medium therefrom. Ideally, the circulating means facilitates draining of the heat transfer medium therethrough from the chilling trough to the refrigerating means. Preferably, the circulating means is adapted for accommodating draining of the heat transfer medium from the

chilling trough to the refrigerating means when the circulating means is deactivated.

In one embodiment of the invention the chilling trough is an elongated chilling trough and defines a longitudinally extending central axis for receiving an elongated container with a central axis of the container lying substantially parallel to the central axis of the chilling trough.

In another embodiment of the invention the chilling trough is disposed with the longitudinally extending central axis thereof extending substantially horizontally. Advantageously, the level control means is located adjacent an axial end of the chilling trough.

In a further embodiment of the invention the chilling trough defines a hollow interior region for receiving the container, and an open mouth for providing access to the hollow interior region. Ideally, the hollow interior region defined by the chilling trough is adapted for receiving one container, and preferably, when viewed in plan, the hollow interior region substantially defines a longitudinal cross section of the container. Advantageously, the open mouth defined by the chilling trough lies in a substantially horizontal plane and faces upwardly, and preferably, the open mouth substantially defines the longitudinal cross-section of the container.

In another embodiment of the invention a lid is provided for closing the open mouth of the chilling trough, the lid being moveable between a closed position closing the open mouth, and an open position providing access through the open mouth to the hollow interior region of the chilling trough. Preferably, the lid is connected to the chilling trough. Advantageously, the lid is connected to the chilling trough adjacent the axial end thereof adjacent the level control means. Ideally, the lid is hingedly connected to the chilling trough.

In another embodiment of the invention a first detecting means is provided for detecting the presence of a container in the chilling trough.

In another embodiment of the invention a second detecting means is provided for detecting the lid in the closed position.

Preferably, the first and second detecting means comprise first and second sensors, respectively. Preferably, each sensor is a plunger operated micro-switch type sensor.

In one embodiment of the invention the first sensor is mounted externally of the chilling trough, and the plunger of the first sensor extends into the chilling trough for engaging the container when located in the chilling trough. Preferably, the first sensor is mounted on the lid, and the plunger extends into the hollow interior region of the chilling trough when the lid is in the closed position for engaging the container when placed in the chilling trough.

In a further embodiment of the invention the plunger of the second sensor is located for engaging the lid when the lid is in the closed position.

In a further embodiment of the invention a control means is provided for controlling the operation of the circulating means, the control means being responsive to the first and second detecting means detecting the presence of a container in the chilling trough, and the lid of the chilling trough being in the closed position for activating the circulating means for circulating the heat transfer medium.

In one embodiment of the invention a monitoring means is provided for monitoring the temperature of the heat transfer medium, and the control means is responsive to the monitoring means for operating the refrigerating means for maintaining the temperature

of the heat transfer medium at a predetermined temperature.

In a further embodiment of the invention a timing means is provided for timing a first predetermined period of time during which the circulating means is operated for circulating the heat transfer medium through the chilling trough for cooling the container to a desired temperature.

In a further embodiment of the invention a control means reads the first detecting means for detecting removal of a container from the chilling trough after the first predetermined period of time.

In one embodiment of the invention the timing means times a second predetermined period of time from the end of the first predetermined period of time, and the control means is responsive to the timing means having timed the second predetermined period of time for activating the circulating means for circulating the heat transfer medium in the event that the container has not been removed from the chilling trough after the end of the first predetermined period of time for maintaining the container at the desired temperature.

In another embodiment of the invention the timing means times a third predetermined period of time during which the circulating means is operated from the end of the second predetermined period of time for maintaining the temperature of the container at the desired temperature.

Preferably, the timing means times further second predetermined periods of time at the end of each third period of time.

In one embodiment of the invention the third predetermined period of time is in the range of 0.25 minutes to 1 minute. Preferably, the third predetermined period of time is approximately 0.5 minutes.

In another embodiment of the invention the second predetermined period of time is in the range of 3 minutes to 5 minutes. Preferably, the second predetermined period of time is approximately 4 minutes.

In another embodiment of the invention the first predetermined period of time is in the range of 3 minutes to 5 minutes. Preferably, the first predetermined period of time is approximately 4 minutes.

Advantageously, the timing means is incorporated in the control means.

In one embodiment of the invention the circulating means circulates the heat transfer medium at a rate in the range of 1,000ml per minute to 2,000ml per minute, and preferably, the circulating means circulates the heat transfer medium at a rate of approximately 1,300ml per minute.

In one embodiment of the invention the heat transfer medium is a liquid having a freezing point lower than the freezing point of water. Preferably, the freezing point of the heat transfer medium is below -10°C. Advantageously, the freezing point of the heat transfer medium is below -13°C. Ideally, the freezing point of the heat transfer medium is below -20°C.

Preferably, the heat transfer medium comprises an aqueous solution of propylene glycol.

In one embodiment of the invention the refrigerating means comprises a reservoir for storing the heat transfer medium, and a refrigeration circuit cooperating with the reservoir for maintaining the temperature of the heat transfer medium at a temperature below 0°C. Preferably, the refrigeration circuit maintains the temperature of the heat transfer medium at a temperature below -10°C. Advantageously, the refrigeration

circuit maintains the temperature of the heat transfer medium at a temperature below -13°C. Ideally, the refrigeration circuit maintains the temperature of the heat transfer medium at a temperature of approximately -20°C.

In another embodiment of the invention the refrigeration circuit is operable under the control of the control means.

In another embodiment of the invention a means for moving the container within the chilling trough is provided. Preferably, a means for moving the container within the chilling trough is provided for causing circulation of the contents of the container within the container for improving the heat transfer efficiency between the heat transfer medium and the contents of the container.

Preferably, the means for moving the container is adapted for rotating the container about a longitudinally extending central axis of the container. Advantageously, the means for moving the container comprises a gripping means located in the chilling trough for gripping the container, and a drive means for driving the gripping means is provided. Ideally, the gripping means is adapted for gripping the container adjacent an axial end thereof, and the gripping means is rotatable by the drive means for rotating the container about its longitudinally extending central axis.

In one embodiment of the invention the drive means is mounted externally of the chilling trough. Preferably, the drive means comprises an electrically powered motor. Advantageously, the gripping means is located in the chilling trough adjacent one axial end thereof, and ideally, the gripping means is located adjacent the level control means.

Ideally, a plurality of chilling troughs are provided, each chilling trough having an associated circulating means, the

circulating means of each chilling rough being operable independently of the respective circulating means of the other chilling troughs.

Preferably, that the circulating means of the respective chilling troughs are operable under the control of the control means independently of each other.

Preferably, each chilling trough is connected to the refrigerating means by a corresponding flow means independently of the flow means of the other chilling troughs.

Advantageously, a common return means is provided for returning the heat transfer medium from the respective chilling troughs to the refrigerating means.

Ideally, each chilling trough is provided with an associated first detecting means and an associated second detecting means which are independent of the first and second detecting means associated with the other chilling troughs.

In one embodiment of the invention the chilling troughs are located side by side relative to each other with their respective central axes extending parallel to each other.

In another embodiment of the invention four chilling troughs are provided.

In another embodiment of the invention each chilling trough is adapted for receiving one wine bottle, and in a further embodiment of the invention each chilling trough is adapted for receiving one wine bottle of size in the range of 700ml to 750ml.

In one embodiment of the invention a heating compartment for heating a container is provided, and a second heat transfer medium transfers waste heat from the refrigerating means to the heating

compartment for heating the container therein.

Preferably, a second circulating means is provided for circulating the second heat transfer medium between the refrigeration means and the heating compartment.

Advantageously, the second heat transfer medium is a liquid heat transfer medium, and a second reservoir is provided for the second heat transfer medium, the second circulating means circulating the second heat transfer medium between the second transfer and the heating compartment.

In another embodiment of the invention the heating compartment comprises a heating trough.

In a further embodiment of the invention a plurality of heating troughs are provided.
Preferably, each heating trough is identical to each chilling trough.

Preferably, the heating troughs are located side by side relative to each other with their respective central axes extending parallel to each other. Advantageously, the heating troughs are located side by side relative to the chilling troughs, and the central axes of the respective heating troughs extend parallel to the central axes of the chilling troughs.

In another embodiment of the invention a second flow means is provided for accommodating the second heat transfer medium from the refrigerating means to each heating trough.

In a further embodiment of the invention a level control means is provided for controlling the level of second heat transfer medium in each heating trough.

In another embodiment of the invention a common return means is

provided for returning the second heat transfer medium from one or more of the level control means of the respective heating troughs to the second reservoir.

Preferably, the control means times first, second and third predetermined periods of time for operating the second circulating means of the respective heating troughs in similar fashion as the first, second and third predetermined periods of time are timed in respect of the chilling troughs.

The advantages of the invention are many. One of the most important advantages of the invention is that it permits a wine bottle and the contents thereof to be cooled to a desired chill temperature in a relatively short period of time. This, is achieved by virtue of the fact that the liquid heat transfer medium is circulated along the wine bottle in the chilling trough. By maintaining the liquid heat transfer medium at a temperature of approximately -20°C and circulating the heat transfer medium at the rate of approximately 1,300ml per minute it has been found that the temperature of a wine bottle and its contents may be reduced from room temperature to a desired chill temperature, typically, 3°C in approximately four minutes. Additionally, by providing the cooling device with a plurality of chilling troughs, a number of wine bottles can be simultaneously chilled independently of each other. This is achieved by virtue of the fact that each chilling trough is provided with an independent flow means from the refrigerating means and an independent circulating means. Another important advantage of the invention is that a wine bottle and its contents can be maintained at a desired chill temperature until the bottle has been removed from the chilling trough by virtue of the fact that the heat transfer medium is periodically circulated through the chilling trough at predetermined intervals, namely, second predetermined periods of time for so long as a wine bottle remains in a chilling trough after the first predetermined period of time. Other advantages of the invention are that by virtue of the cooling device being

relatively small, it occupies relatively little space, and additionally, when provided with ground engaging castors can be moved from place to place within a restaurant. Additionally, by virtue of the fact that wine bottles are chilled rapidly, they may be chilled to order, and thus, there is no need for a wine bottle to be left in the cooling device for an extended period of time, thereby avoiding any danger of mould or other bacterial growth growing on the wine bottle or its label.

The invention will be more clearly understood from the following description of some preferred embodiments thereof which are given by way of example only with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a cooling device according to the invention,

Fig. 2 is a perspective device of a portion of the cooling device of Fig. 1,

Fig. 3 is a partly diagrammatic front cross-section elevational view of the cooling device of Fig. 1,

fig. 4 is a side cross-section elevational view of a portion of the cooling device of Fig. 1,

Fig. 5 is a circuit diagram of circuitry of the cooling device of Fig. 1 illustrated in combination with a plan view of the cooling device of Fig. 1,

Fig. 6 is a circuit diagram of a portion of the circuitry of the cooling device of Fig. 1 illustrating the circuitry in combination with a single chilling trough of the cooling device of Fig. 1,

Fig. 7 is a view similar to Fig. 4 of a cooling device

according to another embodiment of the invention, and

Fig. 8 is a view similar to Fig. 6 of a circuit diagram of a portion of circuitry of a cooling device according to another embodiment of the invention, the circuitry being illustrated in combination with a single chilling trough, and a single heating trough of the cooling device.

Referring to the drawings and initially to Figs. 1 to 6 there is illustrated a cooling device according to the invention indicated generally by the reference numeral 1 for cooling wine bottles 2 to a desired chill temperature, typically, 5°C. The cooling device 1 is of cabinet type construction and comprises a housing 3 which is supported on four ground engaging castors (not shown). In this embodiment of the invention the housing 3 is of approximately 700mm in height, and is of area in plan view 900mm in width by 525mm from front 5 to rear 6.

Four chilling troughs 8 are formed in a top panel 9 for receiving four bottles 2 of wine lying on their respective sides, and also for receiving a liquid heat transfer medium, for cooling the wine bottles 2. The chilling troughs 8 are identical to each other, and each chilling trough 8 defines a hollow interior region 10 which in plan view substantially defines the outline of a longitudinal cross-section of a wine bottle. Each chilling trough 8 defines a longitudinally extending central axis 12, and the bottles 2 are placed in the chilling troughs 8 with a longitudinal central axis of the respective bottles extending generally parallel to the central axis 12 of the corresponding chilling trough 8. The chilling troughs 8 are arranged side by side adjacent each other with their respective central axes 12 parallel to each other. Each chilling trough 8 defines an upwardly facing open mouth 15 which is closed by a lid 16. The lids 16 of the respective chilling troughs 8 are hingedly connected to the top panel 9 of the housing 3 adjacent the rear 6 thereof by respective hinges 17. Each lid 16 is hingable from a closed position closing

the hollow interior region 10 of the corresponding chilling trough 8 to an open position for providing access to a wine bottle 2 through the open mouth 15 to the hollow interior region 10. One of the lids 16 is illustrated in the open position in Fig. 1, and three are illustrated in the closed position.

A refrigerating means comprises a reservoir 20 for the liquid heat transfer medium and a refrigeration circuit 21 for maintaining the liquid heat transfer medium in the reservoir 20 at a predetermined temperature, which in this embodiment of the invention is -20°C. The reservoir 20 and refrigeration circuit 21 are located within the housing 3 beneath the chilling troughs 8, see Fig. 3. In this embodiment of the invention the liquid heat transfer medium is an aqueous solution of propylene glycol, the proportion of propylene glycol being such that the freezing point of the aqueous solution is below -20°C, and preferably is in the order of -25°C. A plurality of flow means, namely, four flow pipes 23, one for each chilling trough 8 connect the respective chilling troughs 8 independently of each other to the reservoir 20 for receiving heat transfer medium therefrom. The flow pipes 23 are connected to respective inlet ports 25 of the chilling troughs 8. A common return means, namely, a common return pipe 27 returns the heat transfer medium from the respective chilling troughs 8 to the reservoir 20.

A level control comprising an outlet weir 28 is provided in a rear axial end wall 29 of each chilling trough 8 over which heat transfer medium flows from the respective chilling troughs 8 for maintaining the level of heat transfer medium in the chilling troughs 8 at a predetermined level, which is above a wine bottle 2 when the wine bottle 2 is lying on its side in the chilling trough 8. In other words, each outlet weir 28 maintains the level of heat transfer medium in its corresponding chilling trough 8 so that a wine bottle 2 placed in the chilling trough 8 is completely submerged in the heat transfer medium. An elongated collection channel 30 extends adjacent the rear end wall 29 transversely of

the chilling troughs 8 and communicates with the chilling troughs 8 over the outlet weirs 28 for receiving heat transfer medium from the respective chilling troughs 8. The collection channel 30 slopes downwardly towards a centrally located outlet port 31 for the draining heat transfer medium through the outlet port 31. The common return pipe 27 is connected to the outlet port 31 for returning the heat transfer medium to the reservoir 20.

Four circulating means, namely, four electrically powered circulating pumps 34, one for each chilling trough 8 are located, one in each flow pipe 23 for circulating heat transfer medium from the reservoir 20 to the respective chilling troughs 8 under the control of a control means, namely, a control circuit 35 which is illustrated in block representation only. The circulating pumps 34 are independently operable under the control of the control circuit 35 for delivering heat transfer medium into the corresponding chilling trough 8 independently of the other chilling troughs 8 and for circulating the heat transfer medium independently through the chilling troughs 8. The refrigeration circuit 21 is also operated under the control of the control circuit 35.

The inlet ports 25 to the respective chilling troughs 8 are located at the lowest point of the hollow interior region 10 of each chilling trough 8 for facilitating draining of the respective chilling troughs 8 through the corresponding inlet port 25. The circulating pumps 34 are of the type which when deactivated permit return flow of heat transfer medium therethrough to the reservoir 20. Thus, a drain means is provided for draining the heat transfer medium from each chilling trough 8 when the corresponding circulating pump 34 has been deactivated.

A first detecting means for detecting the presence of a wine bottle 2 in the respective chilling troughs 8 comprises four first sensors 38, namely four plunger type operated micro-switches, one for each chilling trough 8. The respective first sensors 38 are

located on the respective lids 16 and plungers 39 of the first sensors 38 extend into the hollow interior regions 10 of the chilling troughs 8 when the corresponding lids 16 are in the closed position for engaging a wine bottle 2 in the chilling troughs 8. A second detecting means for detecting when the lids 16 of the respective chilling troughs 8 are in the closed position comprises four second sensors 40, namely, plunger type operated micro-switches, one being provided for each chilling trough 8. The second sensors 40 are located in the housing 3 beneath the top plate 9, and plungers 41 of the respective second sensors 40 extend through the top plate 9 for engaging the lid 16 of the corresponding chilling trough 8. The first and second sensors 38 and 40 are connected to the control circuit 35 and their status is read by the control circuit 35. A microprocessor 42 in the control circuit 35 controls the control circuit 35 for in turn controlling the refrigeration circuit 21 and for operating the circulating pumps 34 in response to the first and second sensors 38 and 40.

A timing means, namely, a timer 43 in the control circuit 35 times three predetermined periods of time, namely, a first predetermined period of time, a second predetermined period of time and a third predetermined period of time for each chilling trough 8. The circulating pumps 34 are continuously operated during the first predetermined period of time for circulating heat transfer medium from the reservoir 20 through the chilling troughs 8 for cooling a wine bottle 2 in the corresponding chilling troughs 8 to the desired chill temperature. At the end of the first predetermined period of time the circulating pump 34 remains deactivated. The second predetermined period of time is timed by the timer 43 immediately at the end of the first predetermined period of time, and during the second predetermined period of time the relevant circulating pump 34 is deactivated. The third predetermined period of time is timed by the timer 43 at the end of the second predetermined period of time if the wine bottle 2 has not been removed from the relevant chilling trough 8 during the second

predetermined period of time. During the third predetermined period of time the circulating pump 34 corresponding to the relevant chilling trough 8 is again operated for circulating the heat transfer medium for maintaining the temperature of the wine bottle 2 at the desired chill temperature while the wine bottle 2 is left in the chilling trough 8. The timer 43 under the control of the microprocessor 42 continues to sequentially time second predetermined periods of time and third predetermined periods of time for so long as the wine bottle remains in the chilling trough 8 for maintaining the wine bottle 8 at the desired chill temperature. The timer 43 times first, second and third periods of time for the corresponding chilling troughs 8 and the circulating pumps 34 independently of each other.

In this embodiment of the invention the first predetermined period of time timed by the timer 43 is approximately four minutes. The second predetermined period of time timed by the timer 43 is approximately four minutes, and the third predetermined period of time is approximately thirty seconds. It has been found that by circulating the heat transfer medium at a temperature of approximately -20°C for four minutes at a flow rate of approximately 1,300ml per minute is sufficient for reducing the temperature of a wine bottle, and needless to say, the contents thereof from room temperature to a desired chill temperature, which typically, is approximately 5°C. It has been found that by circulating the heat transfer medium for a third predetermined period of time of approximately 30 seconds at intervals of four minutes, namely, the second predetermined periods of time is sufficient for maintaining the temperature of the wine bottle and its contents at the desired chill temperature while the wine bottle 2 remains in a chilling trough 8 after its temperature has been reduced to the desired chill temperature at the end of the first predetermined period of time.

Referring to Fig. 6, the refrigeration circuit 21 is a conventional refrigeration circuit which comprises a compressor

45, a condenser 46, an evaporator 47 and an expansion valve 49, all of which will be well known to those skilled in the art and their inter-connection within the refrigeration circuit 21 will be well known to those skilled in the art. The expansion valve 49 is responsive to a temperature sensor 50 which monitors the temperature of the refrigerant from the evaporator 47. A temperature sensor 52 is located in the reservoir 20 for monitoring the temperature of the heat transfer medium in the reservoir 20. The temperature sensor 52 is read by the control circuit 35. The evaporator 47 and compressor 45 are operated under the control of the control circuit 35 in response to the sensor 52 for maintaining the temperature of the heat transfer medium at approximately -20°C in the reservoir 20.

The lower profile of each chilling trough 8 in side elevational view is shaped to have a raised portion 54 and a lower portion 55, see Fig. 4. The height of the raised portion 54 above the lower portion 55 is such that when a wine bottle is placed in the hollow interior region 10, the side wall of the bottle adjacent the base rests on the lower portion 55, and the neck of the bottle is supported on the raised portion 54 with most of the side wall of the bottle spaced apart above the lower portion 55, see Fig. 4. This facilitates circulation of the heat transfer medium substantially around the entire circumference of the wine bottle 2 along substantially the entire length of the wine bottle 2. The inlet port 25 of each chilling trough 8 is located in the lower portion 55 of the chilling trough 8.

In use, when a wine bottle 2 is placed in one of the chilling troughs 8 and the lid 16 is closed, the plunger 39 of the corresponding first sensor 38 is depressed by engaging the wine bottle 2, thereby closing the micro-switch of the first sensor 38, and delivering a signal to the control circuit 35 indicating that a wine bottle has been placed in the relevant chilling trough 8. The plunger 41 of the second sensor 40 is depressed on engaging the lid 16, and closes the micro-switch of the second sensor 40,

thereby sending a signal to the control circuit 35 indicating that the lid 16 of the relevant chilling trough 8 is closed. On receiving the signals from the first and second sensors 38 and 40, the control circuit 35 activates the circulating pump 34 which corresponds to the chilling trough 8 in which the wine bottle 2 has been placed and the lid 16 has been closed, thereby circulating heat transfer medium from the reservoir 20 through the flow pipe 23 into the relevant chilling trough 8, and the timer 43 commences to time the first predetermined period of time of four minutes. On the heat transfer medium rising to the level of the outlet weir 28 of the chilling trough 8, the heat transfer medium flows over the outlet weir 28 into the collecting channel 30, and is returned through the common return pipe 27 to the reservoir 20. The circulating pump 34 is continuously operated for the duration of the first predetermined period of time for continuously circulating the heat transfer medium through the chilling trough 8.

When the timer 43 has timed the first predetermined period of time the circulating pump 34 is deactivated. Deactivation of the circulating pump 35 permits heat transfer medium in the chilling trough 8 to return through the flow pipe 23 to the reservoir 20, thereby draining the chilling trough 8 and the wine bottle 2 and its contents at this stage are chilled to the desired chill temperature of approximately 3°C. By opening the lid 16 the wine bottle 2 may be removed from the chilling trough 8 and is ready for use.

At the end of the first predetermined period of time, the timer 43 commences to time the second predetermined period of time also of four minutes. At the end of the second predetermined period of time should the wine bottle 2 not have been removed from the chilling trough 8, the timer 43 commences to time a third period of time of approximately thirty seconds, and the control circuit 35 reactivates the relevant circulating pump 34 for again circulating heat transfer medium through the chilling trough 8

continuously for the duration of the third predetermined period of time for returning and maintaining the temperature of the wine and the wine bottle 2 at the desired chill temperature of approximately 3°C. The timer 43 continues to alternatively and sequentially time second and third predetermined periods of time until the wine bottle 2 has been removed from the chilling trough 8. The presence or otherwise of a wine bottle 2 in a chilling trough 8 during the second and third periods of time is determined by the control circuit 35 from the status of the first sensor 38 of that chilling trough 8.

On the wine bottle 2 having been removed from the chilling trough 8 the first sensor 38 and the second sensor 40 reset the part of the control circuit 35 which controls the circulating pump 34 which corresponds to that chilling trough for timing a cooling cycle for the next wine bottle in that chilling trough 8.

Referring now to Fig. 7 there is illustrated a portion of a cooling device according to another embodiment of the invention, which is indicated generally by the reference numeral 60. The cooling device 60 is substantially similar to the cooling device 1, and similar components are identified by the same reference numerals. Four chilling troughs 8 are provided in the cooling device 60. The main difference between the cooling device 60 and the cooling device 1 is that a means for moving the wine bottle 2 within each chilling trough 6 is provided for causing circulation of the wine within the wine bottle 2 for facilitating heat transfer between the wine in the wine bottle 2 and the heat transfer medium. In this embodiment of the invention the means for moving the wine bottle 2 rotates the wine bottle about its longitudinally extending central axis, and comprises a gripping means which is provided by a cup shaped grip 62 for engaging the wine bottle 2 adjacent its end. The grip 62 is carried on a shaft 63 which is rotatable in bearings (not shown) in the rear end wall 29 and an end wall 65 which are formed in the top plate 9. A drive means, namely, an electrically powered motor 66 is located

and mounted in a sub-housing (not shown) which extends from the rear of the housing 3 for driving the shaft 63 for in turn rotating the grip 62. One grip 62, one shaft 63 and one motor 66 are provided for each chilling trough 8, and the motors 66 are operated independently of each other under the control of the control circuit 35 in the same sequence as the corresponding circulating pumps 34. In other words, when the circulating pumps 34 of the respective chilling troughs 8 are operated, the corresponding motor 66 is also operated for rotating the wine bottle in the relevant chilling trough 8. The motors 66 are operated to drive the grips 62 at a speed of approximately 30 revs per minute. It has been found that by rotating a wine bottle in the chilling trough 8 at a speed of approximately 30 revs per minute sufficient circulation of wine within the wine bottle takes place to improve heat transfer efficiency between the wine in the wine bottle and the heat transfer medium for significantly reducing the time required for chilling the wine bottle to the desired chill temperature. It is envisaged that a wine bottle may be rotated by the grip 62 at rotational speeds in the range of 20 revs per minute to 40 revs per minute, and preferably, speeds in the range of 28 revs per minute to 32 revs per minute. Ideally, the rotational speed of each grip 62 should be maintained constant.

Referring now to Fig. 8, there is illustrated a diagrammatic view of a portion of a cooling device according to another embodiment of the invention which is indicated generally by the reference numeral 70. The cooling device 70 is substantially similar to the cooling device 1, and similar components are identified by the same reference numerals. The main difference between the cooling device 70 and the cooling device 1 is that as well as having four chilling troughs 8 for cooling bottles 2 of wine, the cooling device 1 also comprises two heating troughs 71 for raising the temperature of respective containers, in this case, bottles 2 of red wine to a desired temperature. In Fig. 8, only one chilling trough 8 and one heating trough 71 are illustrated. Each heating

trough 71 is identical to the chilling troughs 8, and the chilling and heating troughs 8 and 71 are arranged side by side with their respective central axes 12 parallel to each other. The two heating troughs 71 are located together, and the four heating troughs 8 are located together. Waste heat from the refrigeration circuit 21 is used for heating a second liquid heat transfer medium, which in this case is water for raising the temperature of respective wine bottles 2 in the heating troughs 71. A second reservoir 72 is located in the housing 3 within which the water heat transfer medium is heated. A pair of second circulating means, namely, circulating pumps 74 which are identical to the circulating pumps 34 independently circulate heated water from the reservoir 72 through respective second flow means, namely, flow pipes 75 to the corresponding heating troughs 71 through respective inlet ports 76. The circulating pumps 74, flow pipes 75 and inlet ports 76 are identical to the circulating pump 34, flow pipes 23 and inlet ports 25, respectively. Level control means for maintaining the level of water in the heating troughs 71 at a level to completely submerge the wine bottles 2 are provided by outlet weirs 77 which are identical to the outlet weirs 28 of the chilling troughs 8. A collection channel 78 located at the rear end of the two heating troughs 71 collects water from the outlet weirs 77 which is returned through a common return pipe 79 to the reservoir 72. Each heating trough 71 is closed by a lid 16 which is hingedly connected by a hinge 17 to the top panel 9 in similar fashion as the lids 16 close the chilling troughs 8. A separate lid 16 is provided for each heating trough 71. Third and fourth detector means provided by third and fourth plunger type operated micro-switch sensors 80 and 81, respectively, detect the presence of a bottle 2 in each heating trough 71, and the lid 16 of that heating trough 71 in the closed position, respectively. Separate third and fourth sensors 80 and 81 are provided for each heating trough 71 and the sensors 80 and 81 are identical to the first and second sensors 38 and 40. The third and fourth sensors 80 and 81 are read by the control circuit 35.

In this embodiment of the invention, the condenser 46 of the refrigeration circuit 21 is replaced by the reservoir 72, and refrigerant of the refrigeration circuit 21 is passed through a heat exchange coil 83 located in the reservoir 72 for cooling the refrigerant, and in turn heating the water in the reservoir 72. In this way, waste heat from the refrigeration circuit 21 is stored in the water in the reservoir 72.

An auxiliary heating means, in this case an electrically powered immersion heater 85 is located in the water reservoir 72 for boosting the heat of the water therein should this be necessary. The immersion heater 85 is operated under the control the control circuit 35 in response to a temperature sensor 86 located in the water reservoir 72 for monitoring the water temperature.

Operation of the cooling device 70 is identical to the cooling device 1 insofar as the chilling troughs 8 are concerned. Operation of the heating troughs 71 is also substantially similar to the operation of the chilling troughs 8. Typically, the temperature of the water in the water reservoir 72 is maintained at approximately 30°C by the heating effect of the heat exchange coil 83. In the event that the temperature of the water in the water reservoir 72 falls below 30°C, the control circuit 35 activates the immersion heater for raising the temperature to 30°C. The circulating pumps 74 are operated independently of each other by the control circuit 35, and in response to the third and fourth sensors 80 and 81 detecting a bottle 2 in one of the heating troughs 71 and the corresponding lid 16 being closed the corresponding circulating pump 74 is operated for circulating water from the reservoir 72 through the relevant heating trough 71 which is returned to the reservoir 72 through the common return pipe 79.

The timer 43 in the control circuit 35 times similar first, second and third predetermined periods of time for operating the circulating pump 74 of the heating trough 71 in which a wine

bottle 2 is placed for heating in similar fashion as the first, second and third predetermined periods are timed in connection with the chilling troughs 1. In this embodiment of the invention, the first, second and third predetermined periods of time will be substantially similar to the first, second and third predetermined periods of time of the chilling troughs 8.

The advantage of this embodiment of the invention is that as well as being capable of cooling wine bottles 2 to a desired chill temperature, the cooling device 70 may also be used to heat wine bottles, typically red wine, to a desired temperature, and a particularly important advantage of the invention is that the wine bottles, in general, can be raised to the desired temperature without the need for additional heat from the immersion heater 85, since, in general, it has been found that the waste heat from the refrigeration circuit 21 is adequate for raising the temperature of wine bottles and the contents thereof to the desired temperature.

It is also envisaged that instead of using a water heat transfer medium for transferring the waste heat from the refrigeration circuit 21 for heating the bottles, air may be used as the heat transfer medium, and in which case the bottles to be heated would be placed in a compartment adjacent the condenser of the refrigeration circuit of the cooling device 1 for heating thereof by the waste heat from the condenser.

While the cooling devices have been described as comprising four chilling troughs, it will be readily apparent to those skilled in the art that the cooling devices may be provided with any number of chilling troughs. For example, in certain cases, a cooling device with a single chilling trough may be provided, and indeed, it is expected that an advantageous form of the cooling device may be one which comprises two chilling troughs.

It will also be appreciated that each chilling trough may be of

any other suitable shape, and indeed, it is envisaged in certain cases that the chilling troughs may be oriented for receiving a wine bottle in a different orientation, for example, standing vertically upwards.

Needless to say, while the heat transfer medium has been described as being an aqueous solution of propylene glycol, any other suitable heat transfer medium may be provided, and it will of course be appreciated that the heat transfer medium may be maintained at any other desired temperature besides -20°C. In cases where the heat transfer medium is to be maintained at a higher temperature than -20°C, it is envisaged that the proportion of propylene glycol in the aqueous solution may vary for raising the freezing point of the heat transfer medium. It will also be appreciated that the first predetermined period of time during which the heat transfer medium is continuously circulated through each chilling trough for cooling a wine bottle may be varied, and in cases where the heat transfer medium is maintained at a higher temperature than -20°C, for example, -13°C, the time to reduce the wine bottle and its contents to the desired chill temperature may be longer. Similarly, the second and third predetermined periods of time may be altered appropriately depending on the temperature at which the heat transfer medium is maintained. Needless to say, it will be appreciated that under varying circumstances, for example, a difference in room temperature between winter and summer, the first, second and third predetermined periods of time may also be varied and/or the temperature at which the heat transfer medium is maintained in order to achieve the desired chill temperature of the wine bottle and its contents may be varied.

CLAIMS

1. A cooling device for cooling a beverage in a container (2), the cooling device (1) comprising a chilling trough (8) for receiving the container (2), characterised in that a refrigerating means (20,21) for chilling a liquid heat transfer medium is provided, and a circulating means (34) circulates the heat transfer medium between the refrigerating means (20,21) and the chilling trough (8) and through the chilling trough (8) for cooling the container (2) therein.

2. A cooling device as claimed in Claim 1 characterised in that a flow means (23) is provided for accommodating the heat transfer medium from the refrigerating means (20,21) to the chilling trough (8).

3. A cooling device as claimed in Claim 2 characterised in that the circulating means (34) cooperates with the flow means (23) for delivering heat transfer medium to the chilling trough (8).

4. A cooling device as claimed in Claim 2 or 3 characterised in that the flow means (23) comprises a flow pipe communicating the chilling trough (8) and the refrigerating means (20,21).

5. A cooling device as claimed in any preceding claim characterised in that the circulating means (34) is located between the refrigerating means (20,21) and the chilling trough (8).

6. A cooling device as claimed in any preceding claim characterised in that the circulating means (34) comprises a circulating pump.

7. A cooling device as claimed in any preceding claim characterised in that a level control means (28) is provided for controlling the level of the heat transfer medium in the chilling trough (8).

8. A cooling device as claimed in Claim 7 characterised in that the level control means (28) is provided for controlling the level of the heat transfer medium in the chilling trough (8) so that the container (2) is submerged in the heat transfer medium during cooling thereof.

9. A cooling device as claimed in Claim 7 or 8 characterised in that the level control means (28) comprises an outlet weir over which heat transfer medium flows from the chilling trough (8).

10. A cooling device as claimed in any preceding claim characterised in that a return means (27) is provided for returning heat transfer medium from the chilling trough (8) to the refrigerating means (20,21).

11. A cooling device as claimed in Claim 10 when dependent on any of Claims 7 to 9 characterised in that the return means (27) comprises a return pipe located for receiving heat transfer medium from the level control means (28), and terminating adjacent the refrigerating means (20,21) for returning the heat transfer medium to the refrigerating means (20,21).

12. A cooling device as claimed in any preceding claim characterised in that an inlet port (25) is provided to the chilling trough (8) through which the heat transfer medium is delivered to the chilling trough (8) by the circulating means (34).

13. A cooling device as claimed in any preceding claim characterised in that a drain means (23,25,34) is provided for draining the heat transfer medium from the chilling trough (8).

14. A cooling device as claimed in Claim 13 when dependent on Claim 12 characterised in that the drain means (23,25,34) comprises the inlet port (25), the inlet port (25) being located adjacent the lowest point (55) of the chilling trough (8) for

draining the heat transfer medium therefrom.

15. A cooling device as claimed in Claim 13 or 14 characterised in that the circulating means (34) facilitates draining of the heat transfer medium therethrough from the chilling trough (8) to the refrigerating means (20,21).

16. A cooling device as claimed in Claim 15 characterised in that the circulating means (34) is adapted for accommodating draining of the heat transfer medium from the chilling trough (8) to the refrigerating means (20,21) when the circulating means (34) is deactivated.

17. A cooling device as claimed in any preceding claim characterised in that the chilling trough (8) is an elongated chilling trough (8) and defines a longitudinally extending central axis (12) for receiving an elongated container (2) with a central axis (12) of the container (2) lying substantially parallel to the central axis (12) of the chilling trough (8).

18. A cooling device as claimed in Claim 17 characterised in that the chilling trough (8) is disposed with the longitudinally extending central axis (12) thereof extending substantially horizontally.

19. A cooling device as claimed in Claim 17 to 18 characterised in that the level control means (28) is located adjacent an axial end (29) of the chilling trough (8).

20. A cooling device as claimed in any preceding claim characterised in that the chilling trough (8) defines a hollow interior region (10) for receiving the container (2), and an open mouth (15) for providing access to the hollow interior region (10).

21. A cooling device as claimed in Claim 20 characterised in

that the open mouth (15) defined by the chilling trough (8) lies in a substantially horizontal plane and faces upwardly.

22. A cooling device as claimed in Claim 20 or 21 characterised in that the open mouth (15) substantially defines the longitudinal cross-section of the container (2).

23. A cooling device as claimed in any of Claims 20 to 22 characterised in that a lid (16) is provided for closing the open mouth (15) of the chilling trough (8), the lid (16) being moveable between a closed position closing the open mouth (15), and an open position providing access through the open mouth (15) to the hollow interior region (10) of the chilling trough (8).

24. A cooling device as claimed in Claim 23 characterised in that the lid (16) is connected to the chilling trough (8).

25. A cooling device as claimed in Claim 23 or 24 characterised in that the lid (16) is connected to the chilling trough (8) adjacent the axial end (29) thereof adjacent the level control means (28).

26. A cooling device as claimed in any of Claims 23 to 25 characterised in that the lid (16) is hingedly (17) connected to the chilling trough (8).

27. A cooling device as claimed in any preceding claim characterised in that a first detecting means (38) is provided for detecting the presence of a container (2) in the chilling trough (8).

28. A cooling device as claimed in any preceding claim characterised in that a second detecting means (40) is provided for detecting the lid (16) in the closed position.

29. A cooling device as claimed in Claim 27 to 28 characterised

in that the first and second detecting means (38,40) comprise first and second sensors (38,40), respectively.

30. A cooling device as claimed in Claim 29 characterised in that each sensor (38,40) is a plunger (39,41) operated micro-switch type sensor (38,40).

31. A cooling device as claimed in Claim 30 characterised in that the first sensor (38) is mounted externally of the chilling trough (8), and the plunger of the first sensor (38) extends into the chilling trough (8) for engaging the container (2) when located in the chilling trough (8).

32. A cooling device as claimed in any of Claims 29 to 31 characterised in that the first sensor (38) is mounted on the lid (16), and the plunger (39) extends into the hollow interior region (10) of the chilling trough (8) when the lid (16) is in the closed position for engaging the container (2) when placed in the chilling trough (8).

33. A cooling device as claimed in any of Claims 29 to 32 characterised in that the plunger (41) of the second sensor (40) is located for engaging the lid (16) when the lid (16) is in the closed position.

34. A cooling device as claimed in any of Claims 27 to 33 characterised in that a control means (35) is provided for controlling the operation of the circulating means (34), the control means (35) being responsive to the first and second detecting means (38,40) detecting the presence of a container (2) in the chilling trough (8), and the lid (16) of the chilling trough (8) being in the closed position for activating the circulating means (34) for circulating the heat transfer medium.

35. A cooling device as claimed in Claim 34 characterised in that a monitoring means (52) is provided for monitoring the

temperature of the heat transfer medium, and the control means (35) is responsive to the monitoring means (52) for operating the refrigerating means (20,21) for maintaining the temperature of the heat transfer medium at a predetermined temperature.

36. A cooling device as claimed in Claim 34 or 35 characterised in that a timing means (43) is provided for timing a first predetermined period of time during which the circulating means (34) is operated for circulating the heat transfer medium through the chilling trough (8) for cooling the container (2) to a desired temperature.

37. A cooling device as claimed in Claim 36 characterised in that the control means (35) reads the first detecting means (38) for detecting removal of a container (2) from the chilling trough (8) after the first predetermined period of time.

38. A cooling device as claimed in Claim 36 or 37 characterised in that the timing means (43) times a second predetermined period of time from the end of the first predetermined period of time, and the control means (35) is responsive to the timing means (43) having timed the second predetermined period of time for activating the circulating means (34) for circulating the heat transfer medium in the event that the container (2) has not been removed from the chilling trough (8) after the end of the first predetermined period of time for maintaining the container (2) at the desired temperature.

39. A cooling device as claimed Claim 38 characterised in that the timing means (43) times a third predetermined period of time during which the circulating means (34) is operated from the end of the second predetermined period of time for maintaining the temperature of the container (2) at the desired temperature.

40. A cooling device as claimed in Claim 39 characterised in that the timing means (43) times further second predetermined

periods of time at the end of each third period of time.

41. A cooling device as claimed in Claim 39 or 40 characterised in that the third predetermined period of time is in the range of 0.25 minutes to 1 minute.

42. A cooling device as claimed in Claim 41 characterised in that the third predetermined period of time is approximately 0.5 minutes.

43. A cooling device as claimed in any of Claims 38 to 42 characterised in that the second predetermined period of time is in the range of 3 minutes to 5 minutes.

44. A cooling device as claimed in Claim 43 characterised in that the second predetermined period of time is approximately 4 minutes.

45. A cooling device as claimed in any of Claims 36 to 44 characterised in that the first predetermined period of time is in the range of 3 minutes to 5 minutes.

46. A cooling device as claimed in Claim 45 characterised in that the first predetermined period of time is approximately 4 minutes.

47. A cooling device as claimed in any of Claims 36 to 46 characterised in that the timing means (43) is incorporated in the control means (35).

48. A cooling device as claimed in any preceding claim characterised in that the heat transfer medium is a liquid having a freezing point lower than the freezing point of water.

49. A cooling device as claimed in Claim 48 characterised in that the freezing point of the heat transfer medium is below

-10°C.

50. A cooling device as claimed in Claim 49 characterised in that the freezing point of the heat transfer medium is below -13°C.

51. A cooling device as claimed in Claim 50 characterised in that the freezing point of the heat transfer medium is below -20°C.

52. A cooling device as claimed in any preceding claim characterised in that the heat transfer medium comprises an aqueous solution of propylene glycol.

53. A cooling device as claimed in any preceding claim characterised in that the refrigerating means (20,21) comprises a reservoir (20) for storing the heat transfer medium, and a refrigeration circuit (21) cooperating with the reservoir (20) for maintaining the temperature of the heat transfer medium at a temperature below 0°C.

54. A cooling device as claimed in Claim 53 characterised in that the refrigeration circuit (21) maintains the temperature of the heat transfer medium at a temperature below -10°C.

55. A cooling device as claimed in Claim 54 characterised in that the refrigeration circuit (21) maintains the temperature of the heat transfer medium at a temperature below -13°C.

56. A cooling device as claimed in Claim 55 characterised in that the refrigeration circuit (21) maintains the temperature of the heat transfer medium at a temperature of approximately -20°C.

57. A cooling device as claimed in any of Claims 53 when dependent on Claim 34 characterised in that the refrigeration circuit (21) is operable under the control of the control means

(35).

58. A cooling device as claimed in any preceding claim characterised in that a means (62,66) for moving the container (2) within the chilling trough (8) is provided.

59. A cooling device as claimed in Claim 58 characterised in that the means (62,66) for moving the container (2) is adapted for rotating the container (2) about a longitudinally extending central axis (12) of the container (2).

60. A cooling device as claimed in Claim 58 or 59 characterised in that the means (62,66) for moving the container (2) comprises a gripping means (62) located in the chilling trough (8) for gripping the container (2), and a drive means (66) for driving the gripping means (62) is provided.

61. A cooling device as claimed in Claim 60 characterised in that the gripping means (62) is adapted for gripping the container (2) adjacent an axial end (29) thereof, and the gripping means (62) is rotatable by the drive means (66) for rotating the container (2) about its longitudinally extending central axis (12).

62. A cooling device as claimed in Claim 60 or 61 characterised in that the drive means (66) is mounted externally of the chilling trough (8).

63. A cooling device as claimed in any of Claims 60 to 62 characterised in that the drive means (66) comprises an electrically powered motor (66).

64. A cooling device as claimed in any of Claims 60 to 63 characterised in that the gripping means (62) is located in the chilling trough (8) adjacent one axial end (29) thereof.

65. A cooling device as claimed in Claim 64 characterised in that the gripping means (62) is located adjacent the level control means (28).

66. A cooling device as claimed in any preceding claim characterised in that a plurality of chilling troughs (8) are provided, each chilling trough (8) having an associated circulating means (34), the circulating means (34) of each chilling rough being operable independently of the respective circulating means (34) of the other chilling troughs (8).

67. A cooling device as claimed in Claim 66 when dependent on Claim 34 characterised in that the circulating means (34) of the respective chilling troughs (8) are operable under the control of the control means (35) independently of each other.

68. A cooling device as claimed in Claim 66 or 67 characterised in that each chilling trough (8) is connected to the refrigerating means (20,21) by a corresponding flow means (23) independently of the flow means (23) of the other chilling troughs (8).

69. A cooling device as claimed in any of Claims 66 to 68 characterised in that a common return means (27) is provided for returning the heat transfer medium from the respective chilling troughs (8) to the refrigerating means (20,21).

70. A cooling device as claimed in any of Claims 66 to 69 characterised in that each chilling trough (8) is provided with an associated first detecting means (38) and an associated second detecting means (40) which are independent of the first and second detecting means (38,40) associated with the other chilling troughs (8).

71. A cooling device as claimed in any of Claims 66 to 70 characterised in that the chilling troughs (8) are located side by side relative to each other with their respective central axes

(12) extending parallel to each other.

72. A cooling device as claimed in any of Claims 66 to 71 characterised in that four chilling troughs (8) are provided.

73. A cooling device as claimed in any preceding claim characterised in that each chilling trough (8) is adapted for receiving one wine bottle (2).

74. A cooling device as claimed in Claim 73 characterised in that each chilling trough (8) is adapted for receiving one wine bottle (2) of size in the range of 700ml to 750ml.

75. A cooling device as claimed in any preceding claim characterised in that a heating compartment (71) for heating a container (2) is provided, and a second heat transfer medium transfers waste heat from the refrigerating means (21) to the heating compartment for heating the container (2) therein.

76. A cooling device as claimed in Claim 75 characterised in that a second circulating means (74) is provided for circulating the second heat transfer medium between the refrigeration means (21) and the heating compartment (71).

77. A cooling device as claimed in Claim 75 or 76 characterised in that the second heat transfer medium is a liquid heat transfer medium, and a second reservoir (72) is provided for the second heat transfer medium, the second circulating means (74) circulating the second heat transfer medium between the second reservoir (72) and the heating compartment (71).

78. A cooling device as claimed in any of Claims 75 to 77 characterised in that the heating compartment (71) comprises a heating trough (71).

79. A cooling device as claimed in Claim 78 characterised in

that a plurality of heating troughs (71) are provided.

80. A cooling device as claimed in Claim 78 or 79 characterised in that each heating trough (71) is identical to each chilling trough (8).

81. A cooling device as claimed in Claim 80 characterised in that the heating troughs (71) are located side by side relative to each other with their respective central axes (12) extending parallel to each other.

82. A cooling device as claimed in any of Claims 80 or 81 characterised in that the heating troughs (71) are located side by side relative to the chilling troughs (8), and the central axes (12) of the respective heating troughs extend parallel to the central axes (12) of the chilling troughs (8).

83. A cooling device as claimed in any of Claims 78 to 82 characterised in that a second flow means (75) is provided for accommodating the second heat transfer medium from the refrigerating means (21) to each heating trough (71).

84. A cooling device as claimed in any of Claims 78 to 83 characterised in that a level control means (77) is provided for controlling the level of second heat transfer medium in each heating trough (71).

85. A cooling device as claimed in any of Claims 78 to 84 characterised in that a common return means (79) is provided for returning the second heat transfer medium from one or more of the level control means (77) of the respective heating troughs (71) to the second reservoir.

86. A cooling device as claimed in any of Claims 76 to 85 characterised in that the control means (35) times first, second and third predetermined periods of time for operating the second

circulating means (74) of the respective heating troughs (71) in similar fashion as the first, second and third predetermined periods of time are timed in respect of the chilling troughs (8).

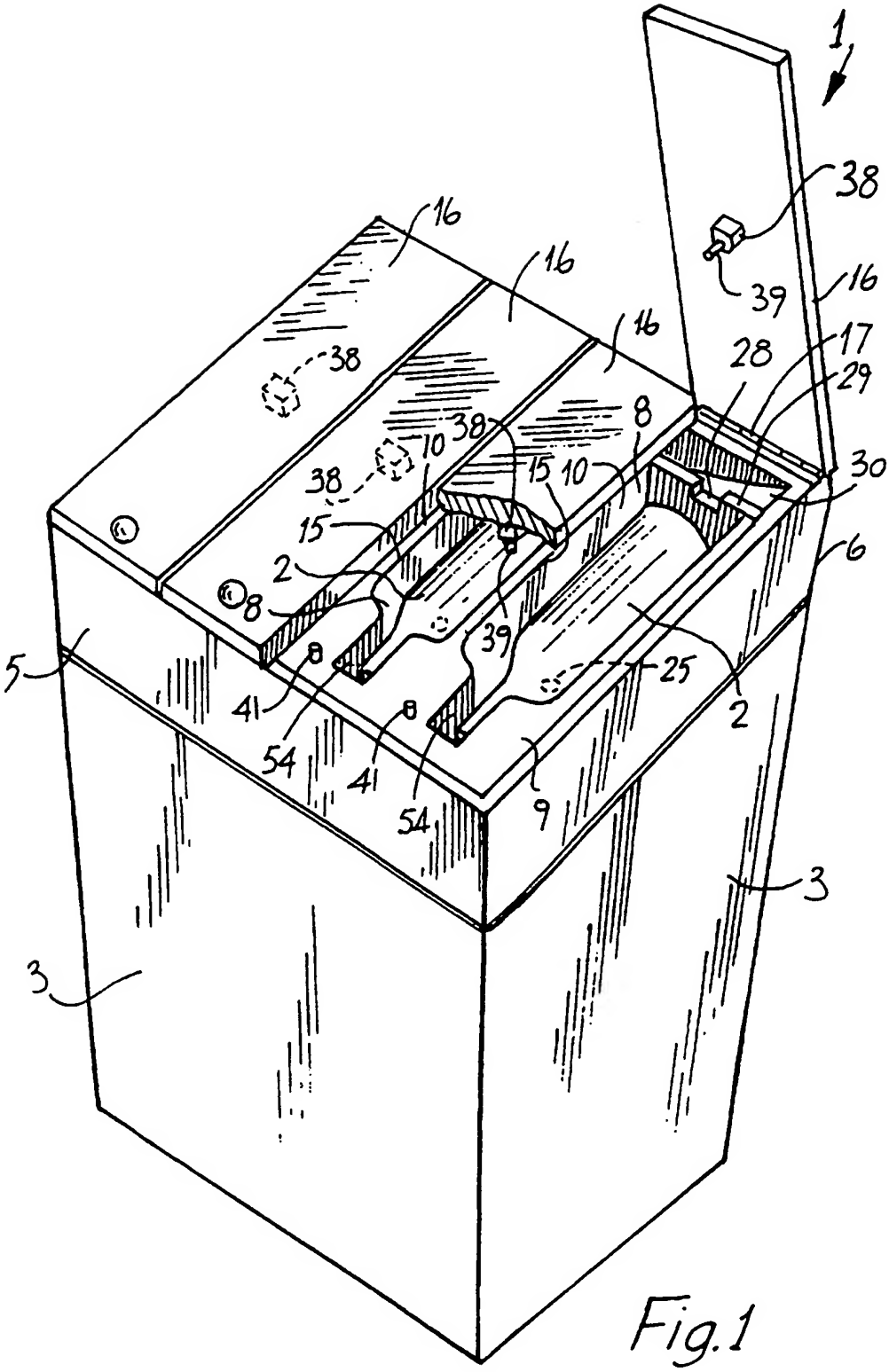
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Fig.1

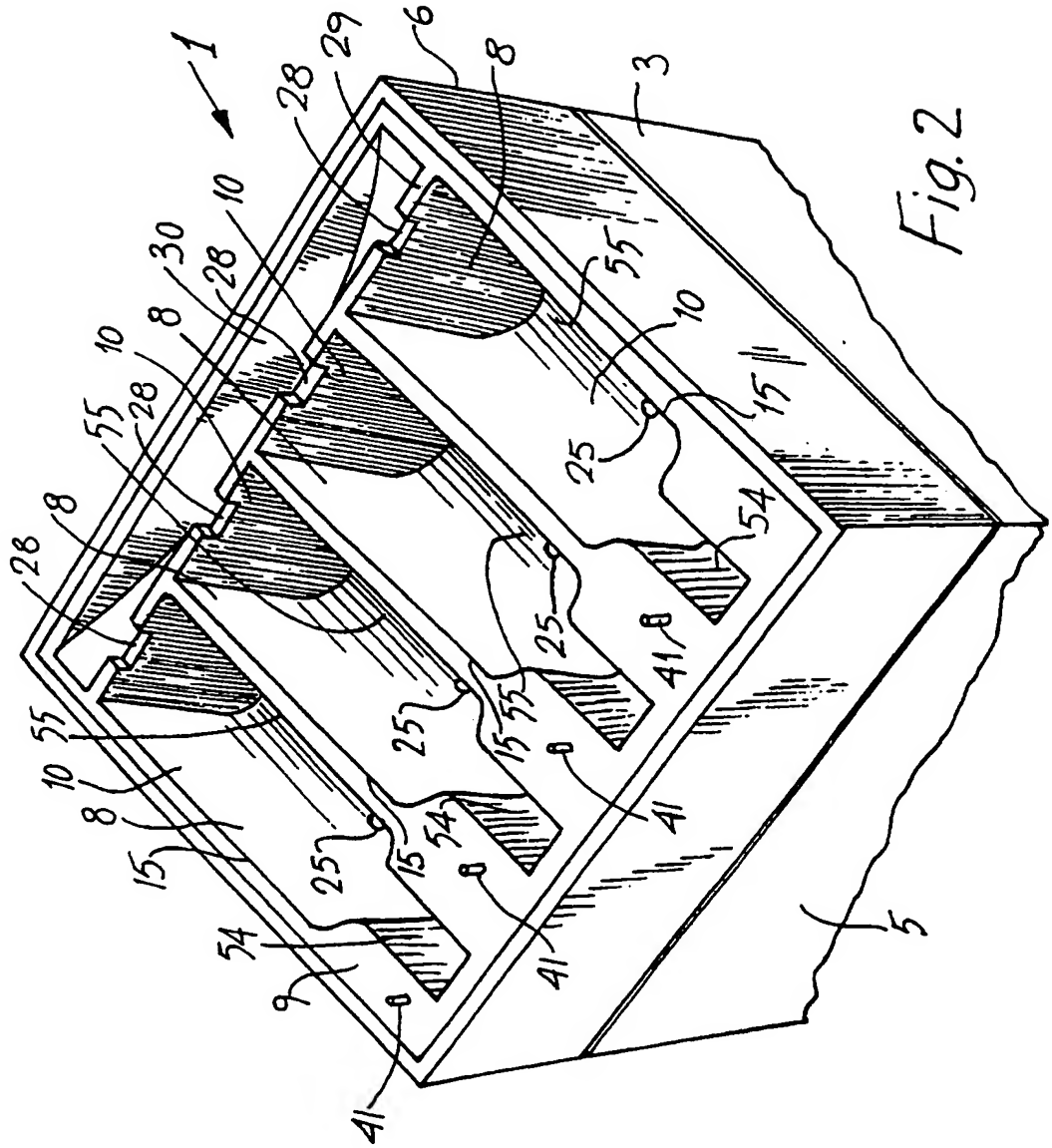

Fig. 2

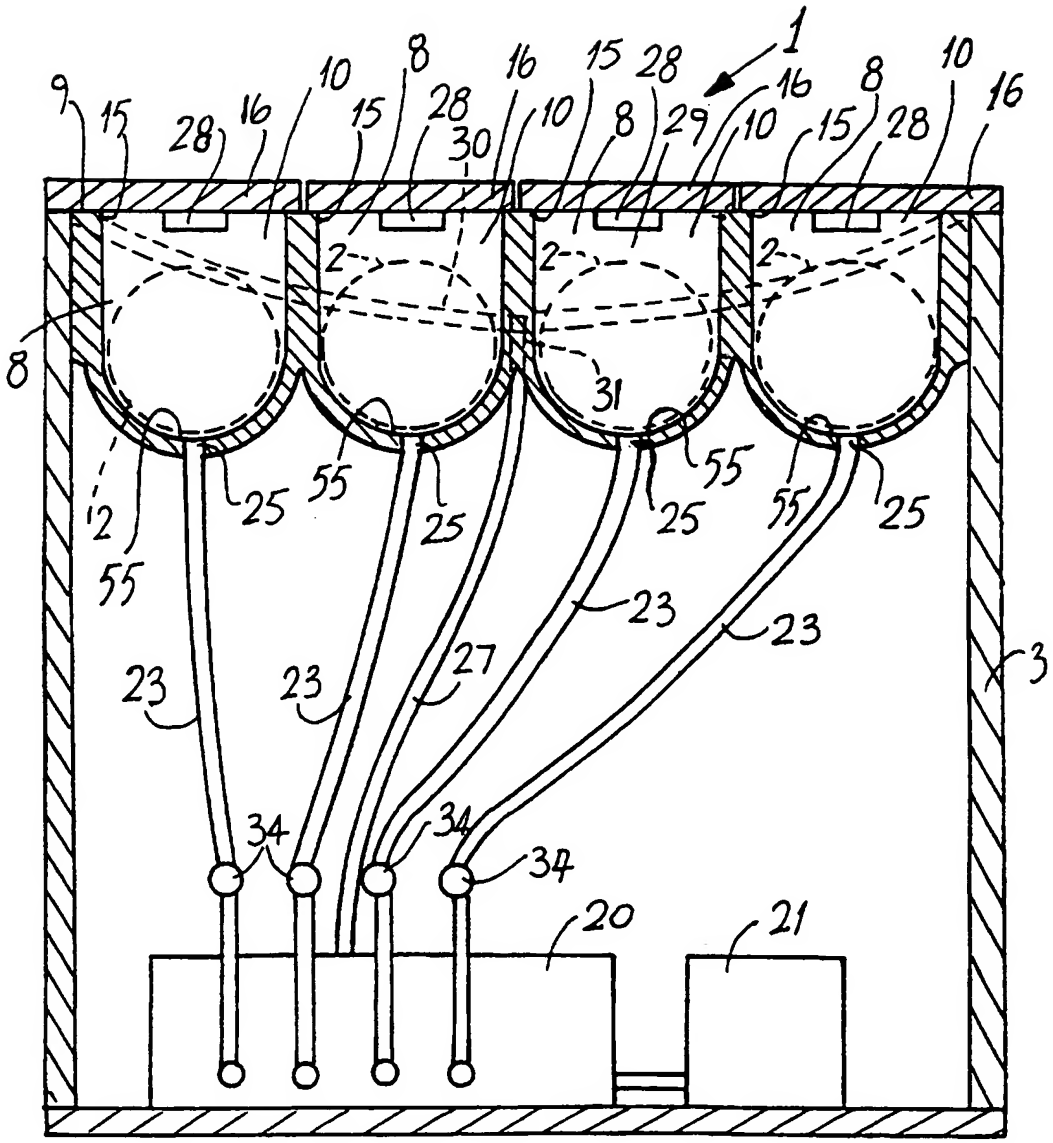
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Fig. 3

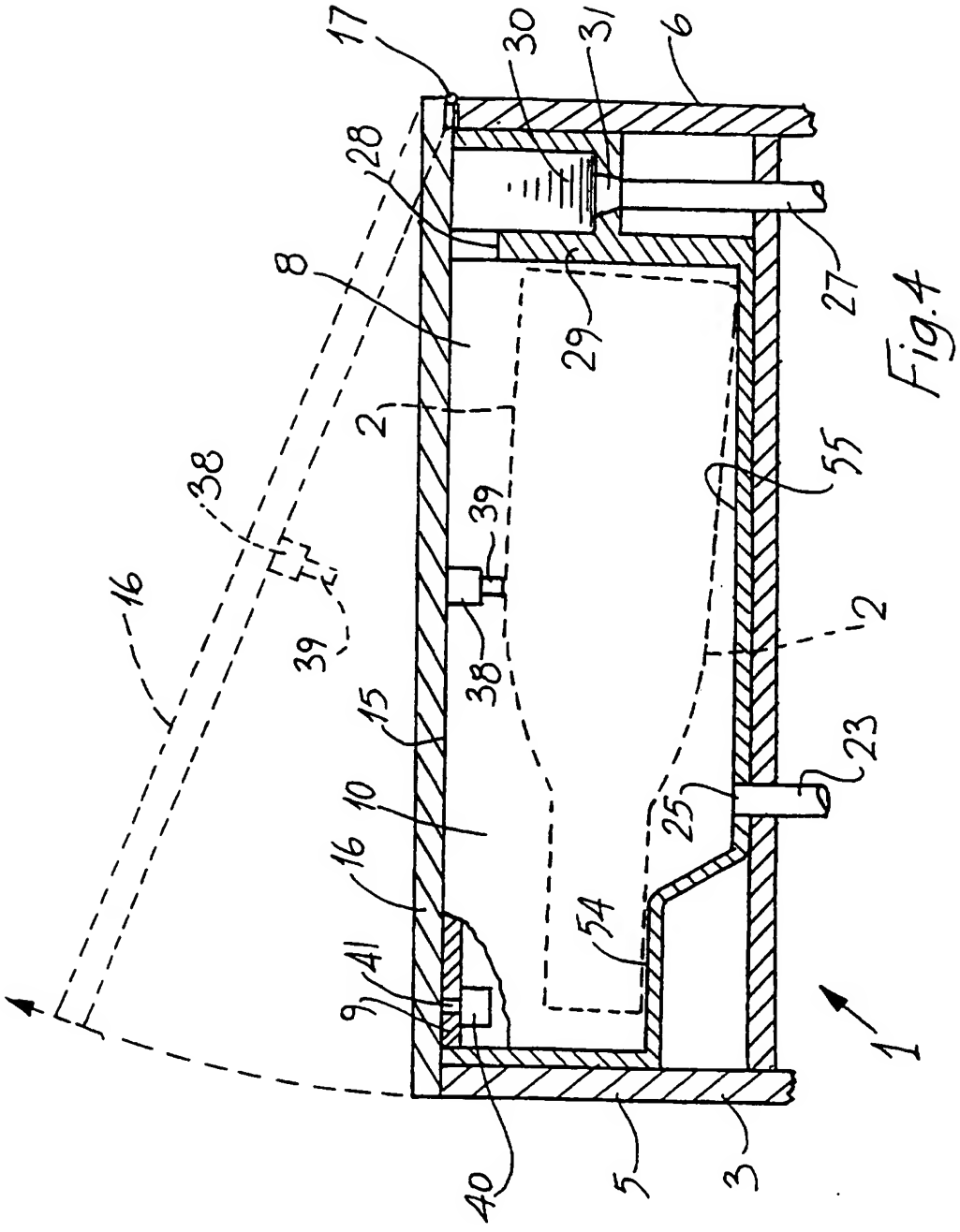

Fig.4

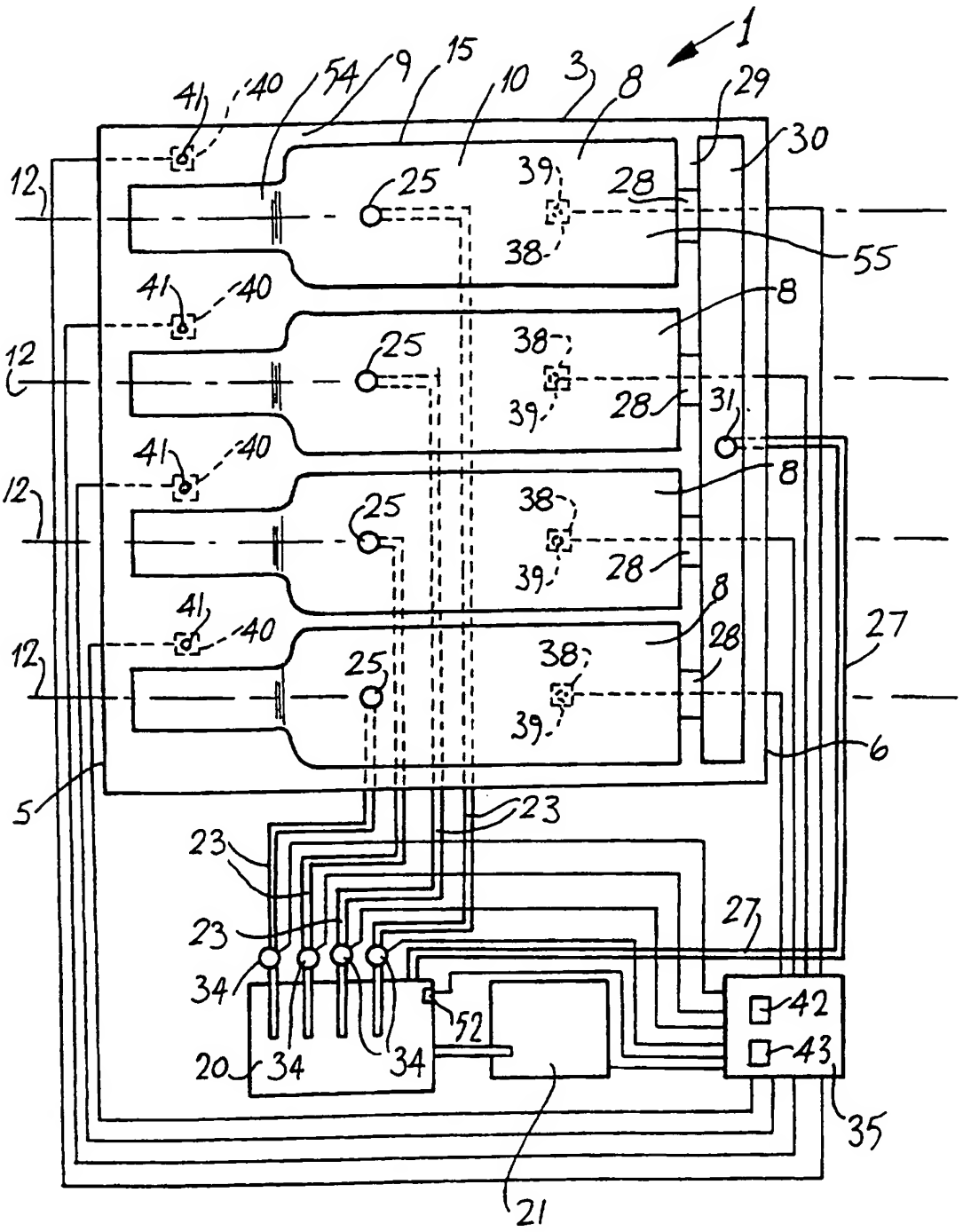
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Fig. 5

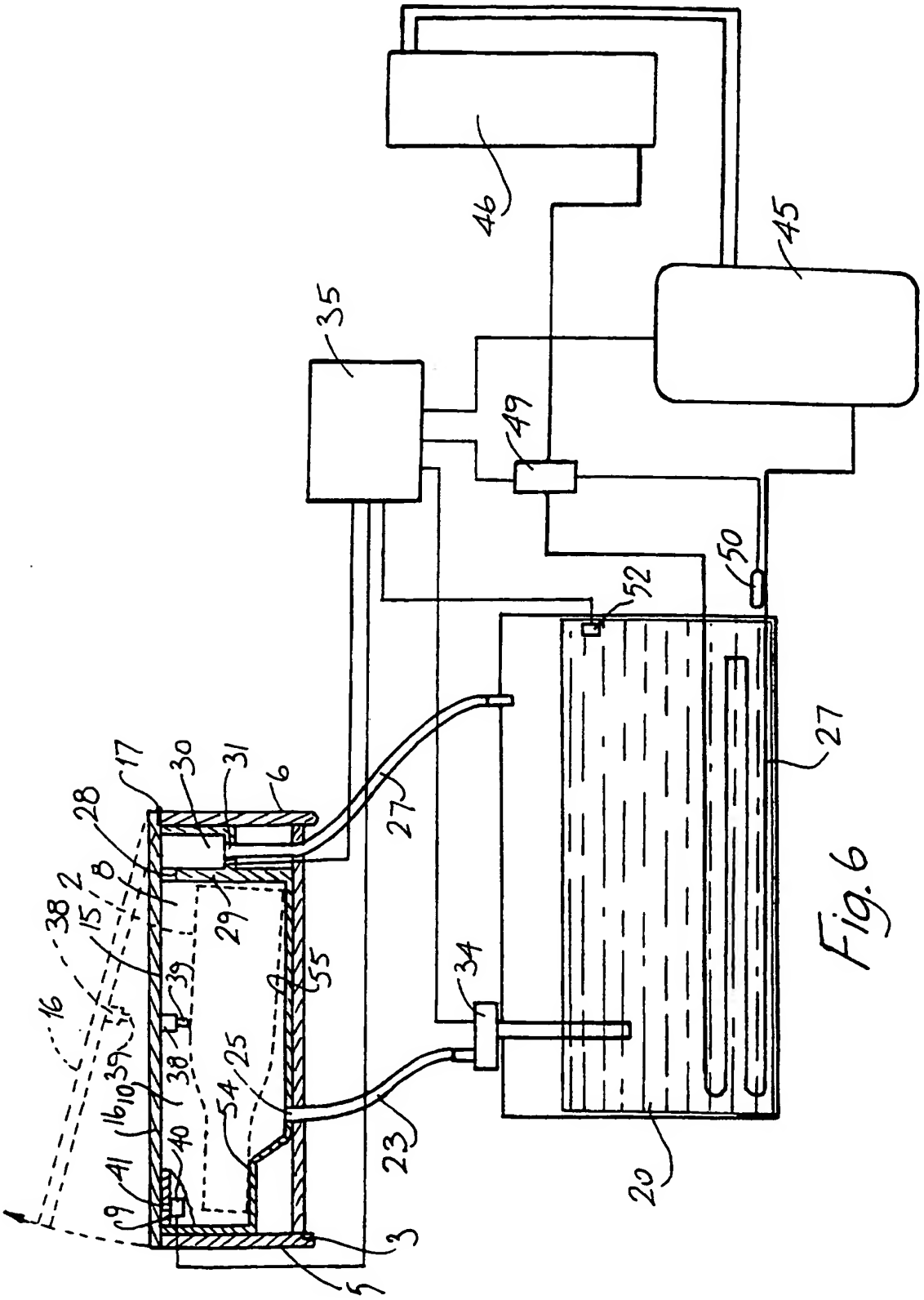
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Fig. 6

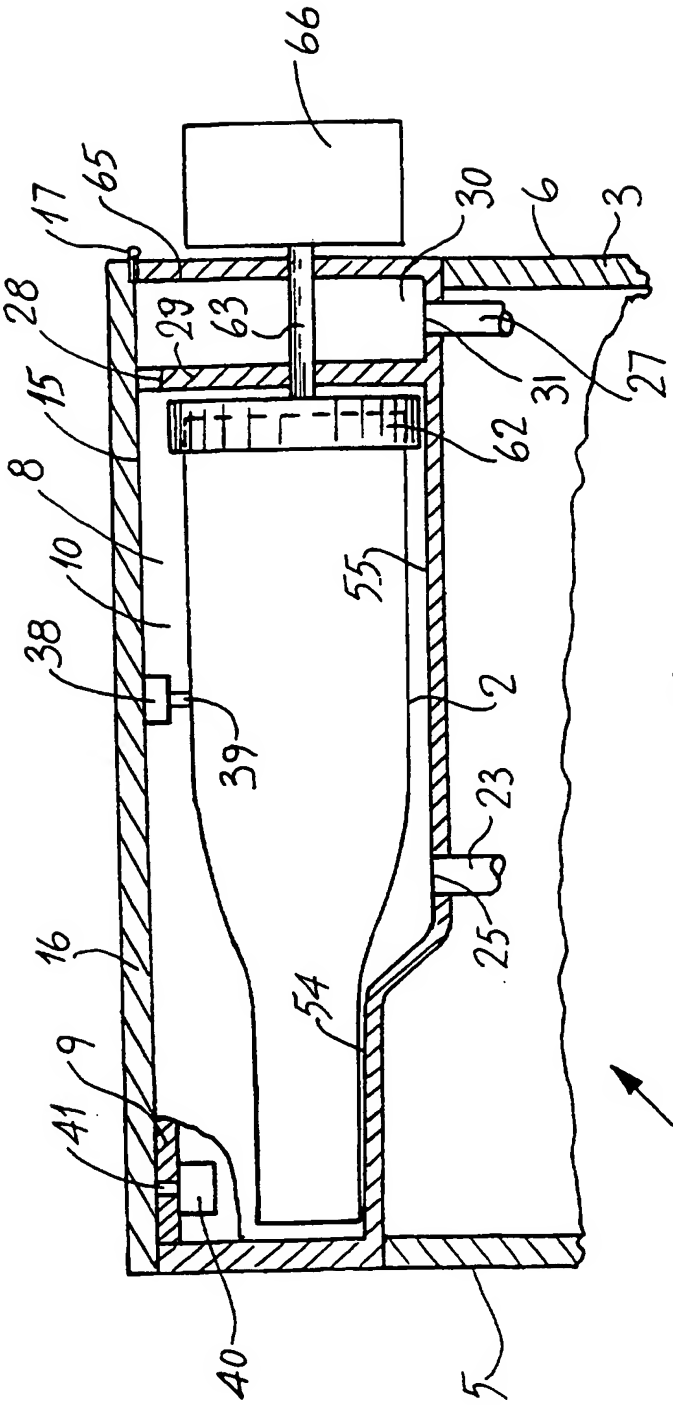
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Fig. 7

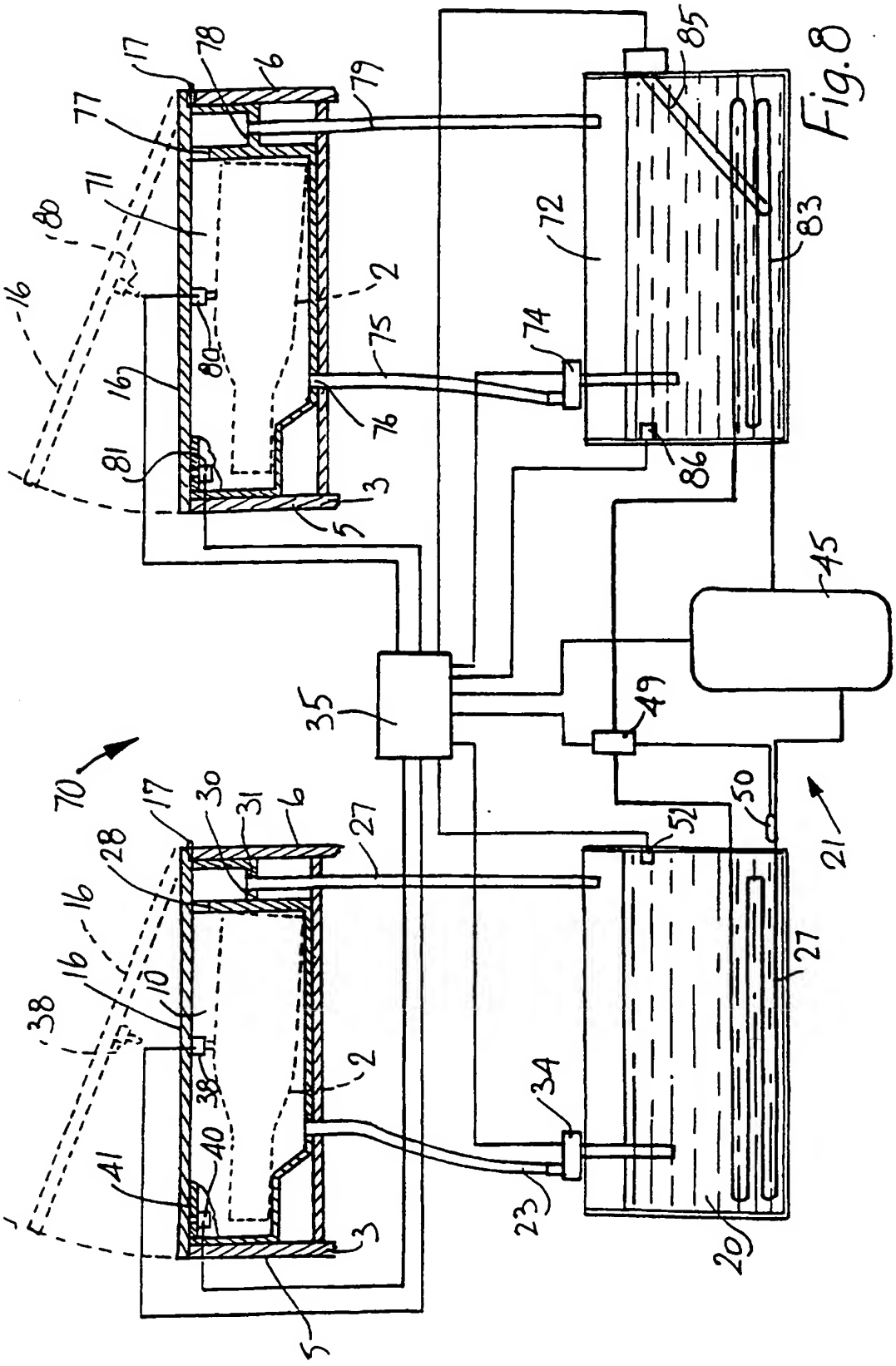
Fig.8
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INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/IE 97/00018

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 F25D31/00 F25D17/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 F25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 3 888 092 A (FISHER) 10 June 1975 see column 2, line 37 - column 5, line 46; figures 1-3	1-10 11-17, 48-57 35,36
Y	EP 0 410 408 A (GRASSI) 30 January 1991	11,12, 53-57
A	see column 2, line 7 - column 3, line 48; figure	1-10,13, 17,35,36
Y	EP 0 347 286 A (ETIENNE) 20 December 1989	13-17, 48-51
A	see column 2, line 15 - column 4, line 49; figure	1-9,12, 36

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
8 July 1997	15 -07- 1997

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Boets, A

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INTERNATIONAL SEARCH REPORT

Inter. nal Application No
PCT/IE 97/00018

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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